

A Digital Correlation Spectrometer Chip with 1 GHz Bandwidth, 4096 Spectral Channels, and 4 W Power Consumption for Passive Microwave Remote Sensing Instruments, Phase I

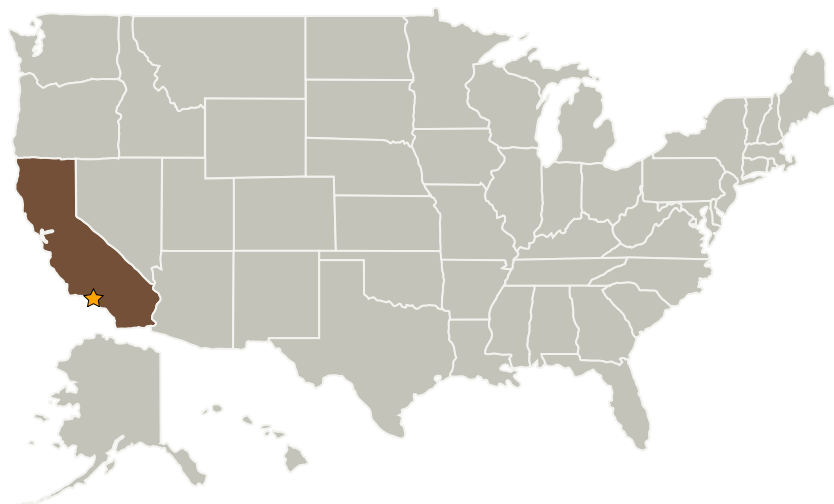
Completed Technology Project (2006 - 2006)



Project Introduction

NASA's future Earth-Sun System missions require the rapid development of small, low-cost remote sensing instruments for the analysis of chemical and physical properties of planetary atmospheres. The objective of the proposed project (Phases I and II) is to research, develop, and demonstrate the first space-qualifiable digital correlation spectrometer on a single chip which, if successful, will reduce the risk, cost, size, and development time of microwave spectrometers and will enable space-science observations measurements that were not previously possible. The innovative approach proposed for achieving the objective consists of a synergistic combination of the following: (a) a unique parallel architecture that will reduce the operating clock frequency, relative to a single-stream architecture, by a factor of 2 and consequently will lower significantly the power consumption, (b) novel differential analog and digital circuits that will improve robustness while operating in the presence of total dose natural radiation found in the space environment, and (c) an advanced 0.13 μm CMOS fabrication process with copper interconnect, available at relatively low-cost through the MOSIS fabrication facility from IBM, for manufacturing high-performance, low-power, reliable, and robust (total dose radiation and latch-up resistant) space-qualifiable chips.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
★ Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
Spaceborne, Inc.	Supporting Organization	Industry	La Canada, California

Primary U.S. Work Locations
California

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX08 Sensors and Instruments
 - TX08.1 Remote Sensing Instruments/Sensors
 - TX08.1.4 Microwave, Millimeter-, and Submillimeter-Waves